



Increments 35 & 36 RP Development Planning

Investigation Title (MIMS): Miniature Ion Mass Spectrometer

PI: Edward C. Sittler Jr., Ph.D., NASA GSFC, Greenbelt, Maryland, USA

RESEARCH OBJECTIVES:

- Provide potential for predicting solar energetic particle (SEP) events that may impact safety of human spaceflight activities
- Deploy Miniature Ion Mass Spectrometer (MIMS) to measure Earth's Ionosphere and ISS external environment
- Measure external plasma composition and rare species at ppm level or less
- Monitor external environment of ISS with application to Mars/NEO payloads and astronaut's environment
- Pathfinder for future network of miniature satellites of Earth's ionosphere with high *in situ* capability

OPERATIONS:

- Instrument will be ground tested and characterized before delivery and launch. GSE in form of laptop will be provided.
- EVA astronauts will deploy MIMS boom and route harness for power and data acquisition. Using laptop astronauts can display mass spectrum of surrounding gases and plasma around the ISS.
- Specific targeted mass group can be displayed to better understand the ISS interaction with Earth's ionosphere.
- Has the capability to measure local electrostatic potential of ISS; multiple locations can provide differential potential measurements.

CONTACT:

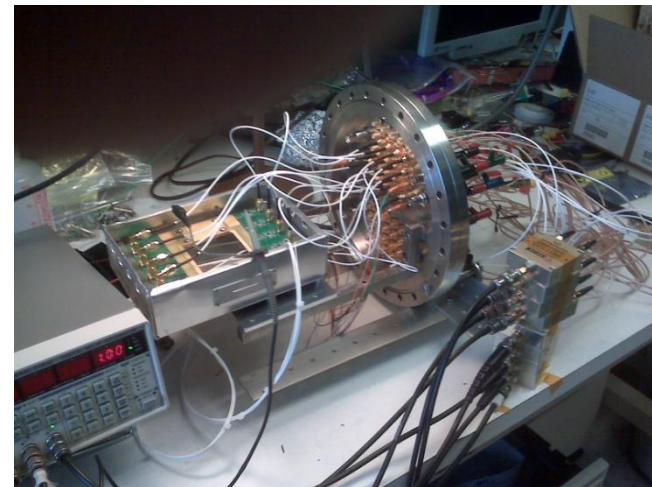
Edward C. Sittler Jr. , Org 673

Tel: 301-286-9215, Cell: 240-252-9582

E-mail: edward.c.sittler@nasa.gov

NASA GSFC Image of HPEG electrical test

- *Using two high precision Stanford Pulse Generators run at 100 kHz repetition rate using external pulse generator.*



Miniature Ion Mass Spectrometer – Requirements/Resource Table

Hardware	<i>MIMS Box (5" x 5" x 5") on 1 meter boom. Can only operate in high vacuum so ground testing uses ion beam facility in high vacuum chambers.</i>	
Facility	<i>Laptop computer , power harness and wireless telemetry (command/data)</i>	
Late access	<i>What hardware requires late access?</i>	None
Pre-flight	<i>Description of requirements</i>	Calibrate in High Vacuum
In-flight: # of sessions	<i>Description of requirements</i>	1 to activate
Post-flight	<i>Description of requirements</i>	Continuous operations
Early Retrieval	<i>What hardware requires early retrieval?</i>	None
Target Subjects	<i>Identify subjects (ISS crew, short –term crew, non-USOS) ISS crew</i>	
Total # of Subjects Required	Short-term	1 crewmember to install and activate
	Long-term	0
Total # of Subjects collected so far	Short-term	0
	Long-term	0
Ground reference	Yes or No	no

Investigation X – Increment 35 & 36 Scenario

**Pre-Flight
Baseline Data
Collection (BDC):**
- Unit tested in
high vacuum,
backfilled with dry
N2 with covers
installed.

Training:
- 1) How to
assemble during
IVA, 2) EVA
installation and 3)
IVA operation.

Post-Flight BDC:
- Record continuous
data. Monitor data by
crew and/or ground.

Activity	Activity Description	Attended	Un-attended
Activity #1	Remove item from stowage container, assemble and perform low voltage test	TBD	TBD
Activity #2	EVA to install assembled unit	TBD	TBD
Activity #3	Harness attached to tbd power connector	TBD	TBD
Activity #4	IVA activates unit via wireless interface	TBD	TBD
Activity #5	Perform startup test to confirm ; conclude EVA	TBD	TBD
Total Crew Time		TBD	TBD

Inc 33-34
Expeditions
33 & 34
crews

Inc 34-35 (Pavel Vinogradov – R

Inc 34-35 (Alexander Misurkin –

Inc 34-35 (Chris Cassidy – USO

Inc 38-39
Expeditions
38 & 39
crews

Inc 35/36 (Luca Parmitano – ASI)

Inc 35/36 (Karen Nyberg – USOS)

Russian segment:

US Lab:

Columbus:

JEM:

The instrument is composed of 5"x5"x5" box with 1 meter boom and power harness. It will have wireless cmd/data interface. Astronaut installation external to ISS so it can see RAM flow, external attachment bracket and harness connector.

